

TABLE 2. THERMODYNAMIC PROPERTIES OF MOIST AIR\* (STANDARD ATMOSPHERIC PRESSURE, 29.921 IN. Hg) (Continued).

| FAHR.<br>TEMP.<br>t(F) | HUMIDITY<br>RATIO<br>W x 10 <sup>3</sup> | VOLUME<br>CU FT/LB DRY AIR |                 |                | ENTHALPY<br>BTU/LB DRY AIR |                 |                | ENTROPY<br>BTU PER (F) (LB DRY AIR) |                 |                | CONDENSED WATER |                          |                      | FAHR.<br>TEMP.<br>t(F) |
|------------------------|------------------------------------------|----------------------------|-----------------|----------------|----------------------------|-----------------|----------------|-------------------------------------|-----------------|----------------|-----------------|--------------------------|----------------------|------------------------|
|                        |                                          | v <sub>g</sub>             | v <sub>ua</sub> |                | h <sub>g</sub>             | h <sub>ua</sub> |                | s <sub>g</sub>                      | s <sub>ua</sub> |                | h <sub>aw</sub> | Entropy<br>Btu/Lb<br>(F) | Vap. Press<br>In. Hg |                        |
|                        |                                          |                            | v <sub>ua</sub> | v <sub>g</sub> |                            | h <sub>ua</sub> | h <sub>g</sub> |                                     | s <sub>ua</sub> | s <sub>g</sub> |                 |                          |                      |                        |
| 7                      | 1.130                                    | 11.766                     | 0.021           | 11.777         | 1.681                      | 1.202           | 2.883          | 0.00364                             | 0.00271         | 0.00635        | -155.81         | -0.3172                  | 5.4022               | 7                      |
| 8                      | 1.189                                    | 11.781                     | 0.022           | 11.803         | 1.922                      | 1.266           | 3.188          | 0.00416                             | 0.00285         | 0.00700        | -140.13         | -0.3102                  | 5.8532               | 8                      |
| 9                      | 1.251                                    | 11.806                     | 0.024           | 11.830         | 2.162                      | 1.332           | 3.494          | 0.00467                             | 0.00299         | 0.00766        | -124.13         | -0.3032                  | 6.3042               | 9                      |
| 10                     | 1.315                                    | 11.831                     | 0.025           | 11.856         | 2.402                      | 1.401           | 3.803          | 0.00518                             | 0.00312         | 0.00832        | -108.17         | -0.2962                  | 6.7552               | 10                     |
| 11                     | 1.383                                    | 11.857                     | 0.026           | 11.883         | 2.642                      | 1.474           | 4.116          | 0.00569                             | 0.00326         | 0.00899        | -92.17          | -0.2892                  | 7.2062               | 11                     |
| 12                     | 1.454                                    | 11.882                     | 0.028           | 11.910         | 2.882                      | 1.550           | 4.432          | 0.00620                             | 0.00340         | 0.00966        | -76.17          | -0.2822                  | 7.6572               | 12                     |
| 13                     | 1.528                                    | 11.907                     | 0.029           | 11.936         | 3.123                      | 1.630           | 4.753          | 0.00671                             | 0.00353         | 0.01034        | -60.17          | -0.2752                  | 8.1082               | 13                     |
| 14                     | 1.606                                    | 11.933                     | 0.030           | 11.963         | 3.363                      | 1.713           | 5.076          | 0.00721                             | 0.00366         | 0.01101        | -44.17          | -0.2682                  | 8.5592               | 14                     |
| 15                     | 1.687                                    | 11.958                     | 0.032           | 11.990         | 3.603                      | 1.800           | 5.403          | 0.00772                             | 0.00379         | 0.01171        | -28.17          | -0.2612                  | 9.0102               | 15                     |
| 16                     | 1.772                                    | 11.983                     | 0.034           | 12.017         | 3.843                      | 1.882           | 5.728          | 0.00822                             | 0.00392         | 0.01240        | -12.17          | -0.2542                  | 9.4612               | 16                     |
| 17                     | 1.861                                    | 12.009                     | 0.035           | 12.044         | 4.083                      | 1.968           | 6.051          | 0.00873                             | 0.00405         | 0.01311        | 4.83            | -0.2472                  | 9.9122               | 17                     |
| 18                     | 1.953                                    | 12.034                     | 0.038           | 12.072         | 4.324                      | 2.058           | 6.412          | 0.00923                             | 0.00419         | 0.01382        | 20.83           | -0.2402                  | 10.3632              | 18                     |
| 19                     | 2.051                                    | 12.059                     | 0.040           | 12.099         | 4.564                      | 2.152           | 6.756          | 0.00973                             | 0.00431         | 0.01454        | 36.83           | -0.2332                  | 10.8142              | 19                     |
| 20                     | 2.152                                    | 12.084                     | 0.042           | 12.126         | 4.804                      | 2.250           | 7.106          | 0.01023                             | 0.00445         | 0.01524        | 52.83           | -0.2262                  | 11.2652              | 20                     |
| 21                     | 2.258                                    | 12.110                     | 0.044           | 12.154         | 5.044                      | 2.348           | 7.460          | 0.01073                             | 0.00458         | 0.01591        | 68.83           | -0.2192                  | 11.7162              | 21                     |
| 22                     | 2.366                                    | 12.135                     | 0.046           | 12.181         | 5.284                      | 2.446           | 7.820          | 0.01123                             | 0.00472         | 0.01657        | 84.83           | -0.2122                  | 12.1672              | 22                     |
| 23                     | 2.485                                    | 12.160                     | 0.049           | 12.209         | 5.525                      | 2.544           | 8.186          | 0.01173                             | 0.00487         | 0.01723        | 100.83          | -0.2052                  | 12.6182              | 23                     |
| 24                     | 2.606                                    | 12.186                     | 0.051           | 12.237         | 5.765                      | 2.642           | 8.557          | 0.01223                             | 0.00500         | 0.01790        | 116.83          | -0.1982                  | 13.0692              | 24                     |
| 25                     | 2.733                                    | 12.213                     | 0.054           | 12.265         | 6.005                      | 2.740           | 8.934          | 0.01273                             | 0.00513         | 0.01858        | 132.83          | -0.1912                  | 13.5202              | 25                     |
| 26                     | 2.865                                    | 12.240                     | 0.057           | 12.293         | 6.245                      | 2.838           | 9.317          | 0.01323                             | 0.00526         | 0.01927        | 148.83          | -0.1842                  | 13.9712              | 26                     |
| 27                     | 3.003                                    | 12.267                     | 0.059           | 12.321         | 6.485                      | 2.936           | 9.706          | 0.01372                             | 0.00539         | 0.01996        | 164.83          | -0.1772                  | 14.4222              | 27                     |
| 28                     | 3.147                                    | 12.297                     | 0.062           | 12.349         | 6.725                      | 3.034           | 10.103         | 0.01421                             | 0.00552         | 0.02068        | 180.83          | -0.1702                  | 14.8732              | 28                     |
| 29                     | 3.297                                    | 12.327                     | 0.065           | 12.377         | 6.965                      | 3.132           | 10.506         | 0.01471                             | 0.00565         | 0.02131        | 196.83          | -0.1632                  | 15.3242              | 29                     |
| 30                     | 3.454                                    | 12.358                     | 0.068           | 12.406         | 7.206                      | 3.230           | 10.915         | 0.01519                             | 0.00578         | 0.02195        | 212.83          | -0.1562                  | 15.7752              | 30                     |
| 31                     | 3.617                                    | 12.383                     | 0.071           | 12.434         | 7.446                      | 3.328           | 11.333         | 0.01568                             | 0.00591         | 0.02260        | 228.83          | -0.1492                  | 16.2262              | 31                     |
| 32                     | 3.788                                    | 12.408                     | 0.075           | 12.463         | 7.686                      | 3.426           | 11.758         | 0.01617                             | 0.00604         | 0.02327        | 244.83          | -0.1422                  | 16.6772              | 32                     |
| 33                     | 3.944                                    | 12.433                     | 0.079           | 12.492         | 7.927                      | 3.524           | 12.169         | 0.01666                             | 0.00617         | 0.02397        | 260.83          | -0.1352                  | 17.1282              | 33                     |
| 34                     | 4.107                                    | 12.458                     | 0.082           | 12.520         | 8.167                      | 3.622           | 12.585         | 0.01716                             | 0.00630         | 0.02467        | 276.83          | -0.1282                  | 17.5792              | 34                     |
| 35                     | 4.275                                    | 12.483                     | 0.085           | 12.549         | 8.407                      | 3.720           | 13.008         | 0.01766                             | 0.00643         | 0.02537        | 292.83          | -0.1212                  | 18.0302              | 35                     |
| 36                     | 4.450                                    | 12.508                     | 0.088           | 12.578         | 8.647                      | 3.818           | 13.438         | 0.01816                             | 0.00656         | 0.02607        | 308.83          | -0.1142                  | 18.4812              | 36                     |
| 37                     | 4.631                                    | 12.534                     | 0.093           | 12.607         | 8.887                      | 3.916           | 13.874         | 0.01861                             | 0.00669         | 0.02677        | 324.83          | -0.1072                  | 18.9322              | 37                     |

\* Compiled by John A. Goff and S. Gratch.  
 \* Extrapolated to represent metastable equilibrium with undercooled liquid.

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| FAHR.<br>TEMP.<br>(°F) | HUMIDITY<br>RATIO<br>W x 10 <sup>3</sup> | VOLUME<br>CU FT/LB DRY AIR |                 |                | ENTHALPY<br>BTU/LB DRY AIR |                 |                 | ENTROPY<br>BTU PER (°F) (LB DRY AIR) |                 |                | CONDENSED WATER |                           |                      | FAHR.<br>TEMP.<br>(°F) |  |
|------------------------|------------------------------------------|----------------------------|-----------------|----------------|----------------------------|-----------------|-----------------|--------------------------------------|-----------------|----------------|-----------------|---------------------------|----------------------|------------------------|--|
|                        |                                          | v <sub>g</sub>             | v <sub>ua</sub> |                | h <sub>g</sub>             | h <sub>aa</sub> | h <sub>fg</sub> | s <sub>g</sub>                       | s <sub>ua</sub> |                | h <sub>aw</sub> | Entropy<br>Btu/Lb<br>(°F) | Vap. Press<br>In. Hg |                        |  |
|                        |                                          |                            | v <sub>ua</sub> | v <sub>g</sub> |                            |                 |                 |                                      | s <sub>ua</sub> | s <sub>g</sub> |                 |                           |                      |                        |  |
| 38                     | 4.818                                    | 12.540                     | 0.097           | 12.637         | 9.128                      | 5.191           | 14.319          | 0.01009                              | 0.01097         | 0.03006        | 6.08            | 0.0122                    | 0.23804              | 38                     |  |
| 39                     | 5.012                                    | 12.566                     | 0.101           | 12.666         | 9.368                      | 5.403           | 14.771          | 0.01057                              | 0.01139         | 0.03066        | 7.08            | 0.0142                    | 0.24139              | 39                     |  |
| 40                     | 5.213                                    | 12.569                     | 0.105           | 12.695         | 9.608                      | 5.615           | 15.223          | 0.02005                              | 0.01183         | 0.03188        | 8.09            | 0.0182                    | 0.24767              | 40                     |  |
| 41                     | 5.421                                    | 12.571                     | 0.109           | 12.725         | 9.848                      | 5.827           | 15.675          | 0.02063                              | 0.01228         | 0.03281        | 9.09            | 0.0182                    | 0.25748              | 41                     |  |
| 42                     | 5.638                                    | 12.574                     | 0.114           | 12.755         | 10.088                     | 6.039           | 16.127          | 0.02101                              | 0.01275         | 0.03376        | 10.09           | 0.0202                    | 0.26768              | 42                     |  |
| 43                     | 5.860                                    | 12.576                     | 0.119           | 12.785         | 10.328                     | 6.251           | 16.579          | 0.02149                              | 0.01323         | 0.03472        | 11.10           | 0.0222                    | 0.27813              | 43                     |  |
| 44                     | 6.091                                    | 12.578                     | 0.124           | 12.815         | 10.568                     | 6.463           | 17.031          | 0.02197                              | 0.01373         | 0.03570        | 12.10           | 0.0242                    | 0.28899              | 44                     |  |
| 45                     | 6.331                                    | 12.579                     | 0.129           | 12.846         | 10.809                     | 6.675           | 17.483          | 0.02245                              | 0.01425         | 0.03670        | 13.10           | 0.0282                    | 0.30023              | 45                     |  |
| 46                     | 6.578                                    | 12.580                     | 0.134           | 12.876         | 11.049                     | 6.887           | 17.935          | 0.02293                              | 0.01478         | 0.03771        | 14.10           | 0.0292                    | 0.31185              | 46                     |  |
| 47                     | 6.835                                    | 12.581                     | 0.140           | 12.907         | 11.289                     | 7.099           | 18.387          | 0.02340                              | 0.01534         | 0.03874        | 15.11           | 0.0312                    | 0.32389              | 47                     |  |
| 48                     | 7.100                                    | 12.582                     | 0.146           | 12.938         | 11.530                     | 7.311           | 18.839          | 0.02387                              | 0.01591         | 0.03978        | 16.11           | 0.0321                    | 0.33626              | 48                     |  |
| 49                     | 7.374                                    | 12.583                     | 0.151           | 12.969         | 11.770                     | 7.523           | 19.291          | 0.02434                              | 0.01650         | 0.04084        | 17.11           | 0.0341                    | 0.34913              | 49                     |  |
| 50                     | 7.658                                    | 12.584                     | 0.158           | 13.001         | 12.010                     | 7.735           | 19.743          | 0.02481                              | 0.01711         | 0.04192        | 18.11           | 0.0361                    | 0.36240              | 50                     |  |
| 51                     | 7.952                                    | 12.585                     | 0.164           | 13.032         | 12.250                     | 7.947           | 20.195          | 0.02528                              | 0.01774         | 0.04302        | 19.11           | 0.0381                    | 0.37611              | 51                     |  |
| 52                     | 8.256                                    | 12.586                     | 0.170           | 13.064         | 12.491                     | 8.159           | 20.647          | 0.02575                              | 0.01839         | 0.04414        | 20.11           | 0.0400                    | 0.39028              | 52                     |  |
| 53                     | 8.569                                    | 12.587                     | 0.178           | 13.097         | 12.731                     | 8.371           | 21.099          | 0.02622                              | 0.01906         | 0.04528        | 21.12           | 0.0420                    | 0.40462              | 53                     |  |
| 54                     | 8.894                                    | 12.588                     | 0.185           | 13.129         | 12.971                     | 8.583           | 21.551          | 0.02669                              | 0.01976         | 0.04645        | 22.12           | 0.0430                    | 0.42004              | 54                     |  |
| 55                     | 9.229                                    | 12.589                     | 0.192           | 13.162         | 13.211                     | 8.795           | 22.003          | 0.02716                              | 0.02047         | 0.04763        | 23.12           | 0.0450                    | 0.43565              | 55                     |  |
| 56                     | 9.573                                    | 12.590                     | 0.200           | 13.195         | 13.452                     | 9.007           | 22.455          | 0.02762                              | 0.02121         | 0.04883        | 24.12           | 0.0478                    | 0.45178              | 56                     |  |
| 57                     | 9.934                                    | 13.020                     | 0.208           | 13.228         | 13.692                     | 9.219           | 22.907          | 0.02809                              | 0.02197         | 0.05006        | 25.12           | 0.0497                    | 0.46840              | 57                     |  |
| 58                     | 10.30                                    | 13.045                     | 0.216           | 13.261         | 13.932                     | 9.431           | 23.359          | 0.02855                              | 0.02276         | 0.05131        | 26.12           | 0.0517                    | 0.48558              | 58                     |  |
| 59                     | 10.69                                    | 13.071                     | 0.224           | 13.295         | 14.172                     | 9.643           | 23.811          | 0.02902                              | 0.02357         | 0.05259        | 27.12           | 0.0536                    | 0.50330              | 59                     |  |
| 60                     | 11.08                                    | 13.096                     | 0.233           | 13.329         | 14.413                     | 9.855           | 24.263          | 0.02948                              | 0.02441         | 0.05389        | 28.12           | 0.0556                    | 0.52159              | 60                     |  |
| 61                     | 11.49                                    | 13.121                     | 0.242           | 13.363         | 14.653                     | 10.067          | 24.715          | 0.02994                              | 0.02527         | 0.05521        | 29.12           | 0.0574                    | 0.54047              | 61                     |  |
| 62                     | 11.91                                    | 13.147                     | 0.251           | 13.398         | 14.893                     | 10.279          | 25.167          | 0.03040                              | 0.02616         | 0.05665        | 30.12           | 0.0594                    | 0.55994              | 62                     |  |
| 63                     | 12.35                                    | 13.172                     | 0.261           | 13.433         | 15.133                     | 10.491          | 25.619          | 0.03086                              | 0.02708         | 0.05804        | 31.12           | 0.0613                    | 0.58002              | 63                     |  |
| 64                     | 12.80                                    | 13.197                     | 0.271           | 13.468         | 15.374                     | 10.703          | 26.071          | 0.03132                              | 0.02803         | 0.05935        | 32.12           | 0.0632                    | 0.60073              | 64                     |  |
| 65                     | 13.26                                    | 13.222                     | 0.282           | 13.504         | 15.614                     | 10.915          | 26.523          | 0.03177                              | 0.02901         | 0.06078        | 33.11           | 0.0651                    | 0.62209              | 65                     |  |
| 66                     | 13.74                                    | 13.247                     | 0.292           | 13.539         | 15.855                     | 11.127          | 26.975          | 0.03223                              | 0.03002         | 0.06225        | 34.11           | 0.0670                    | 0.64411              | 66                     |  |
| 67                     | 14.24                                    | 13.273                     | 0.303           | 13.576         | 16.095                     | 11.339          | 27.427          | 0.03269                              | 0.03106         | 0.06376        | 35.11           | 0.0689                    | 0.66881              | 67                     |  |
| 68                     | 14.75                                    | 13.298                     | 0.315           | 13.613         | 16.335                     | 11.551          | 27.879          | 0.03314                              | 0.03213         | 0.06527        | 36.11           | 0.0708                    | 0.69019              | 68                     |  |
| 69                     | 15.23                                    | 13.323                     | 0.327           | 13.650         | 16.576                     | 11.763          | 28.331          | 0.03360                              | 0.03323         | 0.06683        | 37.11           | 0.0727                    | 0.71430              | 69                     |  |

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